PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S)	:	Anant Achyut Setlur, et al.
TITLE	:	LED ILLUMINATION DEVICE WITH LAYERED PHOSPHOR PATTERN
APPLICATION NO.	:	10/813,338
FILED	:	March 30, 2004
CONFIRMATION NO.	:	5092
EXAMINER	:	Patel, Ashok
ART UNIT	:	2879
CONFIRMATION NO.		5092
ATTORNEY DOCKET NO.	:	GLOZ 2 00133

AMENDED APPEAL BRIEF UNDER 37 C.F.R. §41.37

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Amended Appeal Brief is in furtherance of the Notice of Appeal that was mailed to the U.S. Patent and Trademark Office on February 7, 2007 and the Notification of Non-compliant Appeal Brief mailed May 30, 2007.

The fees required under 37 C.F.R. §41.20(b)(2) and any required petition for extension of time for filing this brief and fees therefor, have been paid in the previously filed Transmittal of Appeal Brief on April 6, 2007.

Appellant files herewith an Amended Appeal Brief in connection with the above-identified application wherein claims 14-30 were finally rejected in the Final Office Action of November 30, 2006.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this paper and/or fee is being transmitted to the USPTO by electronic transmission via EFS-Web on the date indicated below.

Cathryn Terchek

Date: June 19 2007

I. REAL PARTY IN INTEREST (37 C.F.R. §41.37(c)(1)(i))

The real parties in interest in this appeal are the inventors named in the caption of this brief (Anant Achyut Setlur, Joseph John Shiang, Alok Mani Srivasta, Holly Ann Comazo, Stanton Earl Weaver, and Charles Adrian Becker) and the assignee of their interests, General Electric Company.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. §41.37(c)(1)(ii))

Currently, it is believed that there are no other appeals or interferences in process or pending before the U.S. Patent and Trademark Office which the present application bases its priority from, or any cases which base their priority upon the present application, that will directly affect, or will be directly affected by, or will have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS (37 C.F.R. §41.37(c)(1)(iii))

The status of the claims set forth after the Final Office Action mailed November 30, 2006 was, and is, as follows:

Withdrawn Claims: 1-13, and 31-37

Allowed Claims: none

Rejected Claims: 14-30

The present appeal is directed specifically to claims 14-30.

IV. STATUS OF THE AMENDMENT (37 C.F.R. §41.37(c)(1)(iv))

No amendments have been made that have not been entered by the Examiner.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER (37 C.F.R. §41.37(c)(1)(v))

First appealed independent claim 14 is directed to a light emitting device comprising a semiconductor light emitter and at least two phosphor materials (page 7, paragraph 0028), wherein a first phosphor material is disposed closer to said semiconductor light emitter than a second phosphor material (page 7, paragraph 0029), said first phosphor material having at least one of a shorter decay time and a lower absorption of radiation emitted from said semiconductor light emitter than said second phosphor material (page 7, paragraph 0030). Figures 2 and 3 show embodiments of this claim.

Second appealed independent claim 29 is directed to a light emitting device comprising a light emitting diode or laser emitting diode and at least two phosphor materials (page 7, paragraph 0028), wherein a first phosphor material is positioned such that radiation emitted from said light emitting diode or laser emitting diode strikes said first phosphor material prior to striking said second phosphor material (page 7, paragraph 0029, lines 8-9), and further wherein said first phosphor material has at least one of a shorter decay time and a lower absorption of radiation emitted from said light emitting diode or laser emitting diode than said second phosphor material (page 7, paragraph 0030). Figures 2 and 3 show embodiments of this claim.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. §41.37(c)(1)(vi))

The Examiner rejected claims 14-16, 19 and 22-30 as being anticipated by U.S. Patent No. 6,501,100 to Srivastava et al. ("Srivastava"). The Examiner further rejected claims 17, 18, 20 and 21 under §103(a) as being unpatentable over Srivastava as applied to claim 14.

VII. ARGUMENTS (37 C.F.R. §41.37(c)(1)(vii))

A. The §102 Rejection

The Examiner rejected claims 14-16, 19 and 22-30 as being anticipated by Srivastava. Appellants respectfully traverse.

Srivastava is directed to a white light lighting system including an LED, and first and second phosphors having different emission characteristics, that together produce a white light. Appellants are somewhat confused by this rejection, as Srivastava is silent with regard to the recitation of claim 14, i.e. wherein the first phosphor material is disposed closer to the semiconductor light emitter than the second phosphor material, with the first phosphor material having at least one of a shorter decay time and a lower absorption of radiation than the second phosphor material.

In this respect, Srivastava discloses that in a preferred embodiment, the first and second phosphors are blended or interspersed to form a *single layer* (see col. 6, lines 60-64). Appellants do acknowledge and the Examiner pointed out that Srivastava does disclose that the phosphors may alternately be in discrete layers (col. 7, lines 4-9). However, despite the Examiner's arguments to the contrary, Srivastava provides absolutely no guidance on the importance of layering the phosphors such that the first layer comprises the phosphor having either a shorter decay time or a lower absorption of radiation from the LED. Indeed, Srivastava does not even disclose which phosphor is layered over the other, much less that it needs to be the one having either a shorter decay time or a lower absorption of radiation from the LED. That is, Srivastava fails to disclose or suggest this feature.

Srivastava does disclose some of the same phosphors used in the present invention such as $A_2P_2O_7$:Eu, Mn. However, there is no indication in Srivastava that this phosphor must be layered closer to the LED than the second phosphor. Rather, Srivastava simply states that the "first and second phosphors 3, 4 may comprise discrete layers formed over the radiation source", without disclosing or requiring which phosphor should be layered closer to the radiation source.

The Examiner attempts to rebut this by argument by stating in the final office action, "This is not found persuasive since, as clearly shown in Figure 1, and col. 5,

lines 39-61, Srivastava discloses the first layer (3) disposed closer to the radiation source than the second layer (4). The Examiner's strained reading of this passage and interpretation of figure 1 is misinformed at best and disingenuous at worst.

In this respect, Figure 1 shows a diagonal line separating first phosphor (3) and second phosphor (4). Thus, as can be seen, the majority of the second phosphor is closer to the radiation source (1) at the top of the figure, while the majority of the second phosphor is closer to the radiation source at the bottom. Thus, it is impossible to say that the "first layer is disposed closer to the radiation source than the second layer" as the Examiner states. It clearly depends on the point where one is measuring, with the net result being that the layers are equidistant from the radiation source, i.e. the mean distance is the same.

Even further however, Srivastava clearly states that "the diagonal line is used for definitional purposes only and not to indicate a mandatory diagonal boundary between the phosphors." (col. 4, lines 35-37). Thus, the Examiner's reliance on this diagonal line in figure 1, misinterpreted as it is, is completely unfounded anyway!

Thus, Srivastava cannot possibly be said to disclose a device where the first phosphor layer is always closer to the LED device than the second phosphor layer. That is, Srivastava could just as easily be read to disclose the second phosphor layer placed closer than the first phosphor layer. It makes no distinction.

Thus, the Examiner cannot rely on a theory of inherency either. That is, Inherency must be a *necessary* result, not merely a *possible* result. *In re Oelrich*, 212 USPQ 323 (CCPA 1981); *Ex parte Keith*, 154 USPQ 320 (POBA 1961). See also, *In re Robertson*, 49 USPQ2d 1949, 1951 (Fed. Cir. 1999).

In relying on a theory of inherency, the Examiner must provide a basis in fact or technical reasoning to support the determination that the allegedly inherent characteristics necessarily flow from the teachings of the prior art. *Ex parte Levy*, 17 USPQ2d 1461 (BPAI 1990).

Here, Srivastava fails to disclose wherein the presently claimed invention would inherently flow from the teachings therein, i.e. where the first phosphor layer would always and necessarily be placed closer to the radiation source than the second phosphor layer. For this reason, Appellants request withdrawal of this rejection.

B. The §103 Rejection

Similarly, the Examiner's rejection of claims 17, 18, 20 and 21 under §103(a) as being unpatentable over Srivastava must also be withdrawn. That is, as discussed in detail above, even assuming the appropriateness of the Examiner's arguments made with regard to these claims, Srivatava fails to disclose or suggest the limitation of claim 1 wherein a first phosphor layer has either a shorter decay time or a lower absorption of radiation from the LED than a second phosphor layer and is placed closer to the radiation source.

For these reasons, Appellants request withdrawal of all rejections.

It is respectfully submitted that the subject application is now in better condition for examination.

CONCLUSION

In view of the above, Appellant respectfully submits that claims 14-30 are not anticipated or rendered obvious by the cited art and are patentable in all respects.

Accordingly, it is respectfully requested that the Examiner's rejections be reversed.

Respectfully submitted,

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Dated: June 19, 2007

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VIII. APPENDIX OF CLAIMS (37 C.F.R. §41.37(c)(1)(viii))

14. A light emitting device comprising a semiconductor light emitter and at least two phosphor materials, wherein a first phosphor material is disposed closer to said semiconductor light emitter than a second phosphor material, said first phosphor material having at least one of a shorter decay time and a lower absorption of radiation emitted from said semiconductor light emitter than said second phosphor material.

15. A device according to claim 14, wherein said semiconductor light emitter comprises a light emitting diode or a laser diode.

16. A device according to claim 14, wherein said semiconductor light emitter emits between about 350 and 440 nm.

17. A device according to claim 14, wherein said first phosphor material is disposed in a matrix material and applied to the LED as a layer.

18. A device according to claim 17, wherein said matrix material is selected from silicone, epoxy and mixtures thereof.

19. A device according to claim 14, further comprising one or more additional phosphor materials.

20. A device according to claim 14, wherein said first phosphor material has at least one of a luminescence decay time of less than about 3 ms and a plaque absorption of less than about 60% at a mean particle size of 10 μm.

21. A device according to claim 14, wherein said second phosphor material has at least one of a luminescence decay time of greater than about 10 ms and a plaque absorption of greater than about 80% at a mean particle size of 10 μm.

22. A device according to claim 14, wherein said first phosphor material

comprises phosphors co-activated with Eu^{2+} and Mn^{2+}.

23. A device according to claim 14, wherein said first phosphor material comprises $(Sr,Ca,Ba,Mg,Zn)_2P_2O_7:Eu^{2+}$, Mn^{2+}; $Sr_4Al_{14}O_{25}:Eu^{2+}$; or blends thereof.

24. A device according to claim 14, wherein said second phosphor material comprises $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):Eu^{2+},Mn^{2+}$.

25. A device according to claim 14, wherein said first phosphor material comprises one or more of $(Ba,Sr,Ca)Al_2O_4:Eu^{2+}$; $(Ba,Sr,Ca)_2SiO_4:Eu^{2+}$; $(Ba,Sr,Ca)_2(Mg,Zn)Si_2O_7:Eu^{2+}$; $(Sr,Ca,Ba)(Al,Ga,In)_2S_4:Eu^{2+}$; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):Eu^{2+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_2:Eu^{2+}$; $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+}$; $(Sr,Ca)_{10}(PO_4)_6*nB_2O_3:Eu^{2+}$; $2SrO*0.84P_2O_5*0.16B_2O_3:Eu^{2+}$; $Sr_2Si_3O_8*2SrCl_2:Eu^{2+}$; $Ba_3MgSi_2O_8:Eu^{2+}$; $Sr_4Al_{14}O_{25}:Eu^{2+}$; $BaAl_8O_{13}:Eu^{2+}$; $(Y,Gd,Tb,La,Sm,Pr,Lu)_3(Al,Ga)_5O_{12}:Ce^{3+}$; and blends thereof.

26. A device according to claim 14, wherein said second phosphor material comprises one or more of $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+},Mn^{2+}$; $(Sr,Ca,Ba,Mg,Zn)_2P_2O_7:Eu^{2+}$, Mn^{2+}; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):Eu^{2+},Mn^{2+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4C_{12}:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)MgP_2O_7:Eu^{2+},Mn^{2+}$; $3.5MgO*0.5MgF_2*GeO_2:Mn^{4+}$; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):Eu^{2+},Mn^{2+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_{12}:Eu^{2+},Mn^{2+}$; and blends thereof.

27. A device according to claim 14 having a color temperature between about 2,500 k and 10,000 k.

28. A device according to claim 14 having a CRI of at least 50.

29. A light emitting device comprising a light emitting diode or laser emitting diode and at least two phosphor materials, wherein a first phosphor material is positioned such that radiation emitted from said light emitting diode or laser emitting diode strikes said first phosphor material prior to striking said second phosphor

material, and further wherein said first phosphor material has at least one of a shorter decay time and a lower absorption of radiation emitted from said light emitting diode or laser emitting diode than said second phosphor material.

30. A light emitting device according to claim 29, wherein said first phosphor material has a lower thermal quenching than said second phosphor material.

IX. EVIDENCE APPENDIX (37 C.F.R. §41.37(c)(1)(ix))

None.

X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. §41.37(C)(1)(x))

None.